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The Pliocene and Pleistocene Insectivores *(Mammalia)* of Poland

I. *Erinaceidae* and *Desmaninae*

[Pp. 435—462, 9 text-figures]

Owadożerne *(Mammalia)* pliocenu i plejstocenu Polski. I. *Erinaceidae* i *Desmaninae*

Плиоценовые и плейстоценовые насекомоядные Польши *(Insectivora, Mammalia)*. I. *Erinaceidae* и *Desmaninae*

Abstract: A description of teeth and cranial fragments of hedgehogs and water-moles from the Polish Pliocene and Lower Pleistocene is presented. The occurrence of the following species has been established: *Erinaceus samsonowiczi* SULIMSKI, *Erinaceus* sp., *Desmana nehringi* KORMOS and *Desmana kormosi* SCHREUDER. Drawings of the remains found and their measurements are given and their systematic position is discussed.

INTRODUCTION

The present paper is the first one of a series which is designed to cover all the remains of the *Insectivora* from the Polish Pliocene and Pleistocene. The material of hedgehogs and desmans discussed in it was obtained from the localities of Pliocene and Lower Pleistocene faunas in Central Poland. These localities are as follows:

Podlesice. Deposits of a deep cave, containing mostly remains of bats and also those of insectivores, rodents and carnivores. KOWALSKI (1956) first referred them to the Lower Pleistocene, later, however, he arrived at the conclusion that they dated from the Middle Pliocene (KOWALSKI, 1963).

Węże I. Cave deposits with a rich fauna of amphibians, reptiles and mammals, both large and small and belonging to different orders. The literature

concerning this locality and lists of animals are given in the latest publications by Kowalski (1964), Czyżewska (1968, 1969) and Fahlbusch (1969). The age was determined as the Uppermost Pliocene.

Węże II. A locality situated in the vicinity of the previous one and explored by Sulimski (1962a), who published only a preliminary report, giving no descriptions of the remains found. As regards age, it seems to approximate to Węże I.

Rębielice Królewskie I. These are also cave deposits, containing an abundant fauna of vertebrates which date back to the Uppermost Pliocene or Lower Villafranchian. The composition of the fauna is given, among other papers, in those by Młynarski (1960) and Kowalski (1960b).

Rębielice Królewskie II. The filling of a rock crevice situated about 0.5 km from Rębielice Królewskie I. It contained a rich vertebrate fauna. This locality has not been described hitherto and its fauna is probably the same age as Rębielice Królewskie I.

Kadzielnia in Kielce. The filling of a karst pit with numerous remains of small mammals, described chiefly by Kowalski (1958). They are from Early Pleistocene times, probably corresponding to the Tiglian Interglacial.

Kamyk is another locality whose deposits, filling a karst pit, contained a fauna of small vertebrates. The fauna was described by Kowalski (1960a) and recently also by Fahlbusch (1969) and it probably represents the Günz Glacial.

The occurrence of the remains under description at the particular localities is given below in the form of a table.

Species	Podlesice	Węże I	Węże II	Rębielice Król. I	Rębielice Król. II	Kadzielnia	Kamyk
Erinaceus samsonowiczi	—	+	—	—	—	—	—
Erinaceus sp.	—	+	—	+	+	+	+
Desmana nehringi	+	+	—	+	—	—	—
Desmana kormosi	—	+	?	+	+	—	—
Desmana sp.	—	—	—	—	—	—	+

The insectivore groups here discussed have already been partly described in Polish palaeontological literature. In 1956 Kowalski described the remains of *Desmana nehringi* Kormos from Podlesice. Writing about the fauna of Rębielice Królewskie I in 1960, he gave a description of *Desmana kormosi* Schreuder and in 1964 in the list of the fauna from the Polish localities of the Pliocene and Early Pleistocene he also included the finds of hedgehogs and water-moles.

The fauna of insectivores from Węże I has been dealt with more in detail

in the studies by SULIMSKI (1959, 1962b). In it he distinguished *Erinaceus samsonowiczi* as a new species and described the water-moles, counting them in the following species: *Desmana nehringi* KORMOS, *Desmana pontica* SCHREUDER, *Desmana* cf. *kormosi* SCHREUDER and ?„*Galemys* sp.". SULIMSKI also mentions the occurrence of *Desmana* cf. *kormosi* and another, larger, form of the water-mole from Węże II.

The material for the present study consisted of remains derived from the localities at Podlesice, Węże (I), Rębielice Królewskie (I and II), Kadzielnia and Kamyk and belonging to the collection of the Institute of Systematic and Experimental Zoology, Polish Academy of Sciences, in Kraków. By courtesy of the Management of the Earth Museum in Warsaw I was in the position to get to know the materials described by SULIMSKI from Węże I kept in this institution. I had no access to the materials from Węże II. No description of postcranial bones of the forms discussed are included in the present paper.

My thanks go to Dr. J. NEKRUTENKO from Kiev for the loan of a specimen of *Desmana moschata*, to Dr. G. JUBERTHIE from Moulis for a specimen of *Desmana pyrenaica*, and to Dr. O. FEJFAR from Prague for drawing the text figures for this paper.

SYSTEMATIC PART

Order *Insectivora* BOWDICH, 1821
Family *Erinaceidae* BONAPARTE, 1838
Subfamily *Erinaceinae* GILL, 1872
Genus *Erinaceus* LINNAEUS, 1758
Erinaceus samsonowiczi SULIMSKI, 1959
(Fig. 1)

1959 — *Erinaceus samsonowiczi* n. sp.; SULIMSKI, Acta palaeont. pol. 4: 129—132, Pl. II, Figs. 1a—c & 2.

1962 — *Erinaceus samsonowiczi*; SULIMSKI, Acta palaeont. pol. 7: 443—449, Text-fig. 1, Pl. II, Figs. 14—16.

1962 — *Hemiechinus* cf. *samsonowiczi*; KRETZOI, A. Magy. Áll. Földt. Int. 1959: 364.

1964 — *Erinaceus samsonowiczi*; KOWALSKI, Acta theriol. 8: 77.

Material. Węże I: Numerous toothless mandibular fragments, detached permanent teeth, including all kinds of teeth but P^3 (molars in large numbers, other teeth less numerous and only single I_2, P_3 and I^2) and 2 deciduous P^4 (MF/187). A. SULIMSKI's materials in the possession of the Earth Museum in Warsaw were also examined.

Description. The above-mentioned fragments of mandibles and permanent teeth are incomplete insomuch that they add nothing to the description given by SULIMSKI (1959, 1962), who had at his disposal far more abundant

and complete materials. It is worth while, however, to give some attention to the deciduous P^4 teeth. Both the teeth found differ fundamentally from the corresponding premolars in the permanent dentition. Their crown base is triangular in shape, the main, highest cusp is not so pointed and both internal cusps are much smaller than they are in the permanent tooth. The deciduous tooth

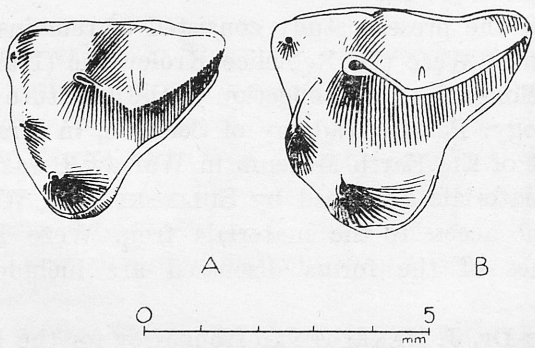


Fig. 1 — *Erinaceus samsonowiczi* SULIMSKI from Węże I, A—B — deciduous P^4

has, besides, completely different proportions: unlike its permanent counterpart, it is relatively long and low.

Measurements (see Table I).

Table I

	Erinaceus samsonowiczi Węże I MF/187							
	deciduous P^4		permanent P^4					
	1	2	1	2	3	4	5	6
length	4·72	4·06	4·14	4·24	4·24	4·35	3·99	4·25
height	2·59	2·59	3·60	3·42	3·60	3·60	3·35	3·42
length/height	1·82	1·57	1·15	1·24	1·18	1·20	1·19	1·24

Systematic position. The characteristic structure of the mandible and its teeth indicates that we are concerned here with the genus *Erinaceus* L., whereas the small size, the sturdy and broad at the base angular process, the proportions of the mental foramen, P_4 with its metaconid poorly developed, the characteristic shape of the lower canine, and M_3 with a strongly reduced trigonid point clearly at the species *E. samsonowiczi* SULIMSKI. The measurements and proportions of the deciduous teeth allow the supposition that they belong to the same species. Besides Węże I this species was also recorded from the locality at Csarnota in Hungary (KRETZOI, 1962). KRETZOI numbers it in the genus *Hemiechinus* without giving any grounds for this decision.

Erinaceus sp.
(Fig. 2)

Material. Rębielice Królewskie I: M_1, M_2, P^4, M^3 and 2 M^2 (MF/969).
Rębielice Królewskie II: M^2 with roots broken off (MF/970).
Kadzielnia: M_2, M^2, M^3 and a fragment of the mandibular ramus (MF/971).
Kamyk: lower canine and M_2 (MF/972).

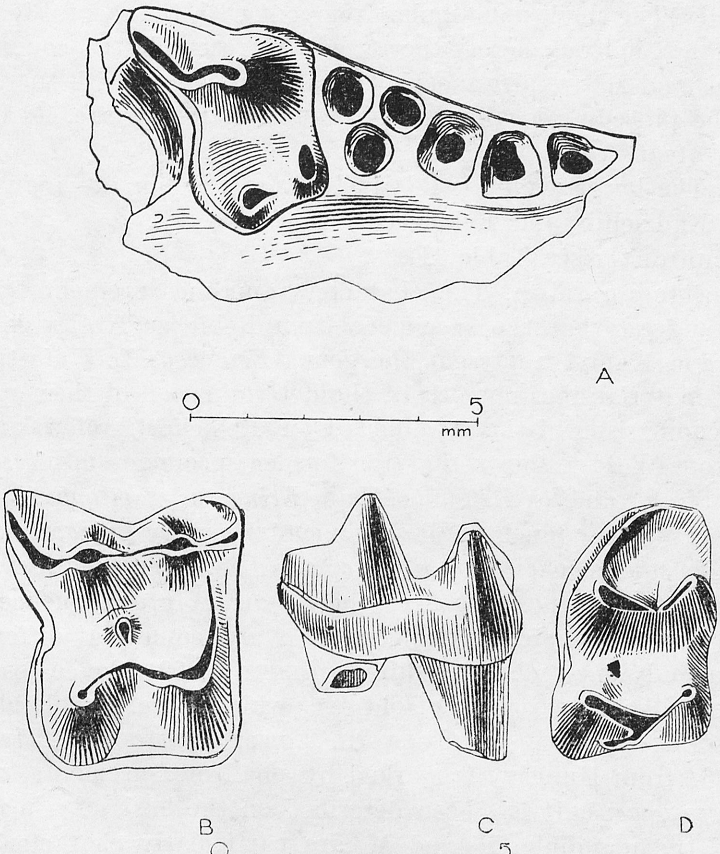


Fig. 2 — *Erinaceus* sp., A — right maxillary fragment with permanent P^4 from Rębielice Królewskie I, B — M^2 from Kadzielnia, specimen no. 3, C—D — M_2 from Kadzielnia, specimen no. 1

Description. Rębielice Królewskie I. M^2 has 3 roots and a nearly square crown base. Its well-developed cingulum disappears only over a very small portion of the hypocone. Both extant teeth are fairly heavily worn, but for all that it can be seen that the cusp between the metacone and the hypocone is very poorly developed. P^4 is a narrow tooth with the cingulum poorly developed, especially between the protocone and the hypocone and on the hypocone.

Single-rooted M^3 has its crown in the shape of an ellipse narrowed on the external side. The well-developed cingulum dwindles only on the lingual side. M_1 and M_2 do not differ from the general structural pattern of the lower molars of the contemporary European hedgehog and are characterized by a high endoconid, higher than the hypoconid, and the disappearance of the cingulum on the lingual side.

Rębielice Królewskie II. M^2 differs only in size from the corresponding tooth from the previous locality.

Kadzielnia. The small mandibular fragment with the mental foramen situated more or less halfway across the ramus. M_2 resembles its counterpart from Rębielice. M^2 and M^3 are also morphologically analogous with the teeth described from the preceding localities only that M^3 is very large, its length being particularly great.

Kamyk. The lower canine is relatively large and has no cingulum. M_2 like those from Kadzielnia and Rębielice Królewskie.

Measurements (see Table II).

Systematic position. The characters and measurements given in the description suggest that the specimens from Rębielice Królewskie I and II, Kadzielnia and Kamyk represent the genus *Erinaceus* L. Unfortunately, the very scanty material does not permit the determination of their specific membership. A comparison of the specimens from Rębielice Królewskie I with the materials from Węże I shows that the former specimens differ somewhat in morphology from and are smaller than *Erinaceus samsonowiczi* SULIMSKI. They are naturally also much smaller than contemporary *Erinaceus europaeus* L. M^1 of both *E. samsonowiczi* and *E. europaeus* has a very well developed cusp between the metacone and hypocone, whereas on M^1 from Rębielice Królewskie this cusp is almost completely reduced. M^3 is also somewhat different, chiefly in that it has only one root. According to LECHE (1902), the coalescence of the roots in the hedgehog is a sign of old age, which is very probable, since the tooth discussed is rather heavily worn. Lower Pleistocene *Erinaceus lechei* KORMOS, 1934 from Hungary is marked by small measurements, smaller than those of *E. europaeus*. It has been described on the basis of a mandible. The structure of the mandible, P^4 and M_3 are particularly characteristic of this species. Unluckily, the material from Rębielice Królewskie includes mostly upper teeth and, consequently, it was impossible to compare it with this last species.

M^2 from Rębielice Królewskie II is also relatively small, though its measurements lie within the limits of variation of the specimens from Węże I.

The measurements of the specimens from Kadzielnia, except M^3, agree with those of the specimens from Węże I. However, the fragment of the mandibular ramus, though the same size as that in *E. samsonowiczi*, differs from it in the situation of the mental foramen. The mandible of *E. samsonowiczi* is marked by a very low position of this foramen, at a third of the height of the ramus, whereas in the specimen from Kadzielnia it is situated higher than

Table II

Dimensions of lower and upper dentition

	Erinaceus samsonowiczi			*Erinaceus* sp.											
	Węże I			Rębielice Królewskie II MF/970	Kamyk MF/972		Rębielice Królewskie I MF/969						Kadzielnia MF/971		
	min	avg	max	1	1	2	1	2	3	4	5	6	1	2	3
C_1 length (max.)	2·70	2·95	3·20			3·40									
width (max.)	2·00	2·15	2·30			2·40									
M_2 length (max.)	4·10	4·55	4·80		4·25		4·75	4·20					4·20		
width (max.)	3·10	3·32	3·52		3·20		3·50	2·90					3·00		
P^4 length (max.)	3·53	3·76	3·96									3·50			
width (max.)	4·46	4·80	5·00									4·30			
M^2 length (max.)	3·96	4·24	4·54	4·46											4·30
width (max.)	4·46	4·94	5·11	4·78						3·85	3·90				4·96
M^3 length (max.)	1·48	1·63	1·87						1·58					1·90	
width (max.)	2·77	3·00	3·35						2·70					3·50	

halfway up the ramus. It has a similar position in contemporary *E. europaeus*. M_2 and M^2 from Kadzielnia do not differ in morphology from the corresponding teeth from Węże or those of *E. europaeus*. Very large M^3 is noteworthy; its measurements equal the measurements of this tooth in *E. europaeus*, but it cannot have belonged to the same dentition as considerably smaller M_2 and M^2. This indicates that there lived two species of hedgehogs at Kadzielnia. Unfortunately, the material is not abundant enough to allow the elucidation of this problem and, besides, molars do not play an essential part in the determination of species of the genus *Erinaceus*.

A similar situation occurs at Kamyk. M^2 does not differ in morphology and measurements from the specimens from Węże I, whereas the second tooth preserved at this locality, the lower canine, is very large and, in contrast to the specimens from Węże but similarly to the corresponding tooth in *E. europaeus*, has no cingulum at all.

The descriptions of the Pleistocene hedgehog species larger than *E. samsonowiczi*, such as *Erinaceus praeglacialis* BRUNNER, 1934 from Germany or *Erinaceus sharonis* BATE, 1937 and *Erinaceus carmelitus* BATE, 1937 from Palestine, do not compare with the remains under description. Judging from the description of *E. praeglacialis*, it is not distinguishable by anything but somewhat larger measurements from *E. europaeus*. As it has been described on the basis of very scanty material, it may be supposed that we are concerned here only with a large specimen of *E. europaeus*. Neither can our materials be compared with *Erinaceus olgae* YOUNG, 1934 from Locality 1 at Choukoutien. However, this last species cannot be taken into consideration in our case because of its smaller measurements.

Family *Talpidae* GRAY, 1825
Subfamily *Desmaninae* THOMAS, 1912
Genus *Desmana* GULDENSTAEDT, 1777
Desmana nehringi KORMOS, 1913
(Figs. 3—4)

1913 — *Desmana* (?) *nehringi* n. sp.; KORMOS, Ann. hist.-nat. Mus. Nat. Hung., 11: 138, Pl. 6, Fig. 1a—f.
1936 — *Desmana nehringi*, HELLER, N. Jb. Min. etc., 76, 76, Beil.-Bd., B: 106.
1938 — *Desmana nehringi*, KORMOS, Festschr. Embr. Strand, 4: 164, Figs. 1—4.
1940 — *Desmana nehringi*, SCHREUDER, Arch. neerl. Zool., 4: 313, Figs. 4, 32b, 35, 41, 50, 62, 67, 80, Pl. 8, Fig. 3; Pl. 9, Figs. 7—11; Pl. 10, Figs. 8, 11—13; Pl. 11, Figs. 3, 4, 14, 19, 23.
1956 — *Desmana nehringi*, KRETZOI, Geol. hung., 27: 162, 184, 187, 260.
1956 — *Desmana nehringi*, KOWALSKI, Acta palaeont. pol., 1 (4): 342—344, Pl. I, Fig. 2a—b, Fig. 3a—d.
1959 — *Desmana nehringi*, SULIMSKI, Acta palaeont. pol., 4 (2): 136—139, Pl. II, Fig. 3a—d.
1961 — *Desmana* sp., FEJFAR, N. Jb. Geol. Palaeont., Abh., 111 (3): 261 (partim).
1962 — *Desmana nehringi*, TOPATCHEVSKY, Inst. Zool. AN URSR, 1: 12—13, Fig. 1, No. 5, Fig. 3 Nos. 7, 8, 18, 19.

1964 — *Desmana nehringi*, KOWALSKI, Acta theriol., 8 (4): 77.
1964 — *Desmana nehringi*, FEJFAR, Rozp. Ustr. ust. geol., 30: 27—31, text-figs. 14a—c, 15a—c, 16a—c.

Material. Podlesice: 2 mandibular fragments with P_2 and P_4 and without processes, M_2, 2 maxillary fragments with P^2, P^4 and M^1, and fragments of a cranial vault (MF/2) (all the material has been described by KOWALSKI, 1956).

Węże I: numerous mandibular fragments and a nearly complete skull (described by SULIMSKI, 1959) and, in addition, 3 mandibular fragments without processes but jointly containing the teeth from P_1—M_2 and 1 maxilla with P^2—M^3 (left side heavily damaged) (MF/967).

Rębielice Królewskie I: 5 mandibular fragments without processes and 5 maxillary fragments. P_4 —M_2 are jointly represented in the mandibles and C—M^2 in the maxillae (MF/964).

Description. Upper teeth. Judging by its alveolus, I^1 was large, broad at the base and oriented perpendicularly to the long axis of the maxilla. The other incisors are small and slanting backwards. The canine has 2 roots and a pronounced cingulum, which disappears only between the roots on the external side of the tooth. In size it is nearly equal to P^1. P^1 has also 2 roots and a well-developed cingulum. Its roots being alined in the tooth row, the tooth itself lies in line with the other teeth. P^2 is markedly longer than its neighbours, C and P^1, and has 3 roots. The third root, small and external, is the thinnest, and the cusp situated above it (deuterocone) is the smallest. The cingulum resembles that on the canine. The next two premolars have also 3 roots each. P^3, having a triangular base with rounded vertices is far smaller than P^2, has a very pronounced deuterocone and its cingulum is present only on a very narrow strip on the internal and external side of the tooth. The deuterocone of P^4 is very robust and supported by the large internal root. The cingulum is present all round the tooth.

The molars have 4 roots (the fourth small root is situated in the middle of the tooth) like all the other *Desmaninae*. The paracone and metacone are well developed, whereas the hypocone is very small compared with the broad protocone. The cingulum appears evidently between these last cusps. M^3 is largely reduced, shorter and narrower than the remaining molars.

Mandible. The low mandibular ramus (lower than in the contemporary desmans) has two foramina mentalia, a large foramen under the posterior root or between the trigonid and talonid of M_1 and the other one, somewhat smaller, under the anterior root of P_2. The symphysis reaches under P_2.

The alveoli of the incisors, canine and first premolar indicate that these teeth were directed forward. I_2 has the largest alveolus. P_1 is very small, single-rooted, with a slightly marked cingulum. P_2, much larger than P_1, has 2 roots and a narrow but very distinct cingulum, which is missing only between the roots on the external side. There is no paraconid. P_3, showing a vestige of the paraconid, sticks out of the tooth row, being positioned obliquely and squeezed

by the neighbouring teeth (P_2 and P_4), which exceed it in size. Its roots are thin and oval in cross-section; the posterior root is displaced to the outside. The fourth premolar has a hardly distinguishable paraconid and no metaconid. The endoconid is the most pronounced cusp. The cingulum occurs all round the tooth.

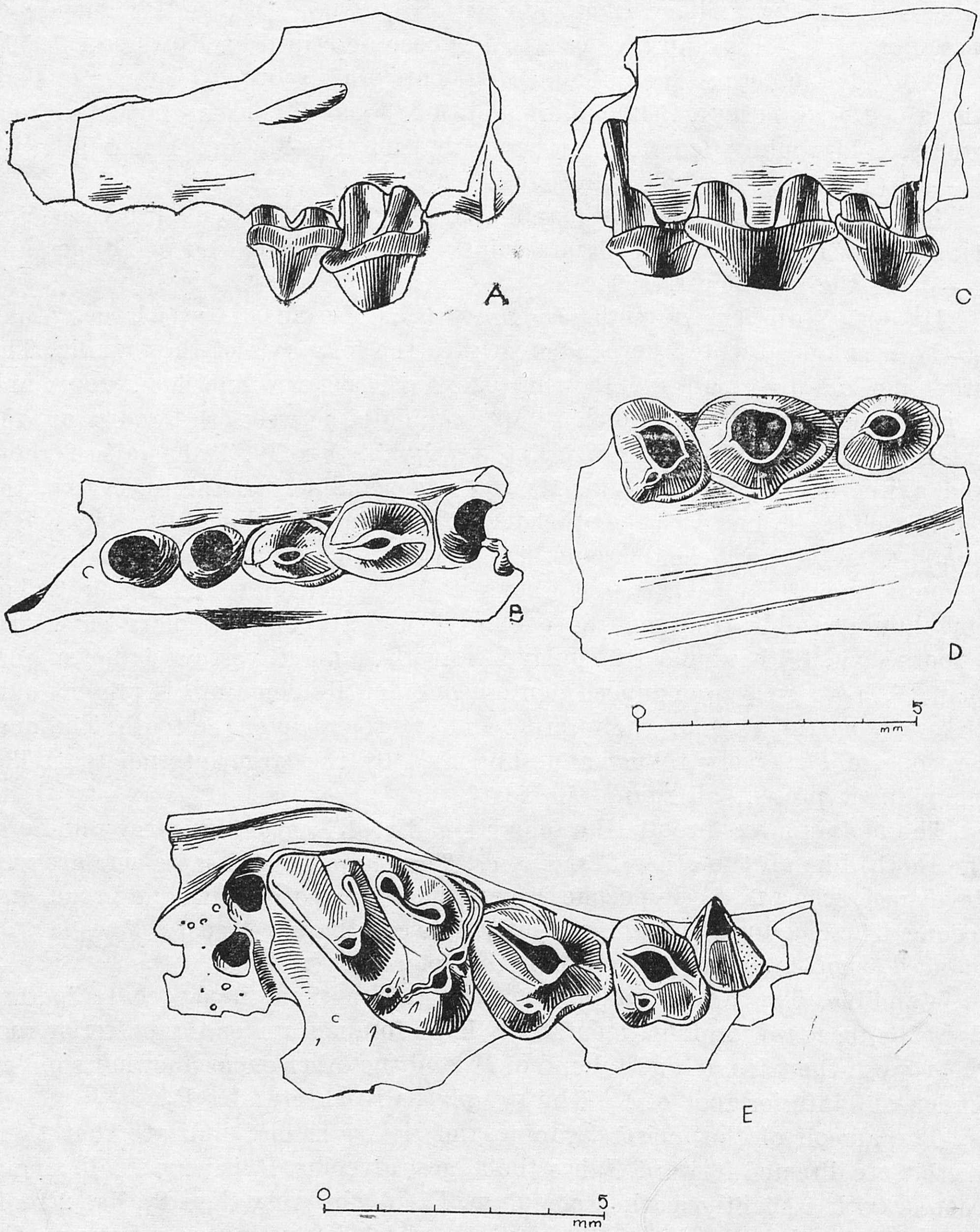


Fig. 3 — *Desmana nehringi* Kormos from Rębielice Królewskie I, A—B — left maxillary fragment with C—P^1, specimen no. 14, C—D — right maxillary fragment with P^1—P^3, specimen no. 20, E — right maxillary fragment with P^2—M^1, specimen no. 2

The first and second molars have a distinct cingulum, which disappears on the metaconid and endoconid on the inside and on the hypoconid on the outside, and additional cusps situated on the lingual side: anteriorly at the base of the paraconid and posteriorly at that of the endoconid. The endoconid is separated from the metaconid by a broad valley. The anterior valley is markedly narrower. M_1 is larger than M_2; no specimens of M_3 have been preserved in the material examined.

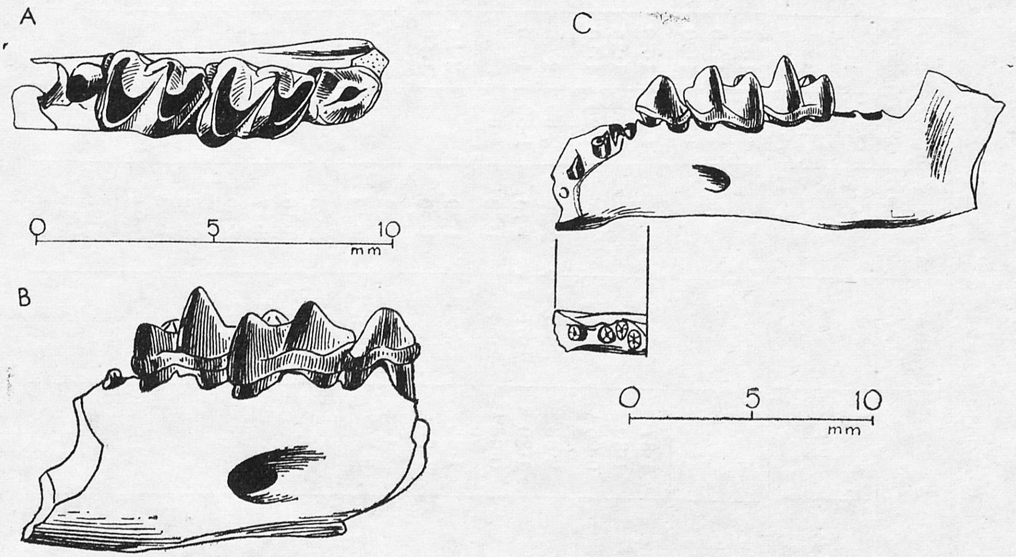


Fig. 4 — *Desmana nehringi* Kormos from Rębielice Królewskie I, A—B — right mandibular fragment with P_4—M_2, specimen no. 2, C — left mandibular fragment with P_4—M_2 and the alveoli of P_3, below anterior part seen from above

Measurements (see Tables III and IV).

Systematic position. The size and morphology of the remains described above indicate without fail that they represent the species *Desmana nehringi* Kormos, 1913. The small measurements place their membership in the group of large water-moles of the species *Desmana moschata* L. and *Desmana thermalis* Kormos out of the question. Out of the small species of the Late Pliocene and Early Pleistocene which might possibly be taken into account, the following ones must be mentioned in addition to *D. nehringi*: *D. kormosi* Schreuder, *Galemys semseyi* Kormos, *Desmana pontica* Schreuder, *D. crassidens* Kretzoi, *Desmogale pannonica* Kretzoi, *Mygalinia hungarica* Kormos, and *Desmana verestchagini* Topatchevsky.

Judging from the description, *Desmana crassidens* Kretzoi, 1954 is somewhat larger and sturdier than *D. nehringi*, whereas *Desmogale pannonica* Kretzoi, 1954, though equal to *D. nehringi* in size, has a slenderer mandible. These differences do not seem significant and perhaps they are only an expression of individual variation. It is difficult to decide this problem, because both the

Table III

Desmana nehringi Kormos, dimensions of upper dentition

	Rębielice Królewskie I MF/964					Podlesice MF/2	Węże I MF/967	in A. Schreuder 1940		Węże I (A. Sulimski, 1959)		
	2	3	8	14	20		1	N.M., B. 4039	Mus. Kiel	1201	1202	1203
C length				1·66				1·85	1·70	1·20	1·10?	1·00
C width				1·19				1·25	1·20	1·30	1·30?	1·10
C height (ext.)				1·15 [1]				1·50	1·20			
P¹ length				1·87	1·87			1·85	1·60	2·00	1·80?	1·90
P¹ width				1·37	1·30			1·30	1·25	1·30	1·30?	1·20
P¹ height (ext.)				1·22 [1]	0·90 [1]			1·20	1·10			
P² length					2·66	2·38	2·27	2·60	2·55	2·10	2·10?	2·20
P² width					1·80	1·51	1·76	1·80	1·80	1·50	1·60?	1·60
P² height (ext.)					0·94 [1]	1·84	1·58	1·60				
P³ length	1·69	1·58			1·44		1·80		2·10	1·30	1·30	1·40
P³ width	1·90	1·87			1·84		1·90		1·80	1·60	1·50	1·60
P⁴ length	2·66	2·63				2·77	2·52			2·50	2·20	2·50
P⁴ width	2·38	2·41				2·45	2·48			2·30	2·30	2·50
M¹ length (ext.)	3·85	3·98	4·21			3·78?	3·96					
M¹ length (across pl.)	2·08	2·16	2·23			2·10	2·16			2·80	2·70	
M¹ width (max.)	3·06	3·17	3·60			2·95?	3·17			3·30	3·30	
M¹ width (at parast.)	2·88	2·88	3·24			2·66?	2·80					
M² length (ext.)							2·80					
M² length (across pl.)							1·90					
M² width (max.)							3·24					
M³ length (ext.)							1·98			1·80	2·00	
M³ length (across pl.)							1·80					
M³ width (max.)							2·45			2·00	2·10	

[1] — deeply worn

forms have been described on the basis of very poor materials (*Desmogale pannonica* on the basis of the anterior portion of a mandible with the alveoli of I_2—M_3 and *Desmana crassidens* on the basis of the anterior portion of a mandible with the alveoli of I_1—P_1 and the teeth P_2 and P_4, and a maxillary fragment with P^3 and P^4; KRETZOI, 1954).

Galemys semseyi KORMOS, 1913 is also known very inexactly (described from a posterior mandibular fragment). Besides, it is not as yet established to which genus this form belongs, for, sure enough, some of its characters agree with those of the genus *Galemys*, but other ones rather resemble the genus *Desmana*, in which some authors (SCHREUDER, 1940; TOPATCHEVSKY, 1962) are inclined to include it. The lack of the cingulum on the molars and the presence of a distinct metaconid on P_4 clearly differ *Galemys semseyi* from our specimens.

Desmana verestchagini TOPATCHEVSKY, 1961 is smaller than *D. nehringi*, the roots of its P_3 lie in line with the roots of the other teeth, the first and second premolars are nearly the same length, and the additional cusps situated on the lingual side at the base of the paraconid and endoconid are almost completely reduced. Although this species has been described on the basis of one mandible only, it differs so much from all the other forms that its distinctness is unquestionable. The characters given above also distinguish it clearly from the remains described in the present paper.

Like *Desmana verestchagini*, *D. kormosi* SCHREUDER, 1940 has its measurements smaller than those of *D. nehringi* and the roots of P_3 round in cross-section and lying in line with the roots of the other teeth. Moreover, the larger number of the foramina mentalia (3 or 4), the lack of the cingulum between the hypocone and the protocone on the upper molars and its presence round the deuteroconid and in the middle of the protoconid of P_4 also differ *D. kormosi* in an essential manner from *D. nehringi* and the specimens described above.

Although *Desmana pontica* SCHREUDER, 1940 has the roots of P_3 squeezed and pushed out of the tooth row, yet the presence of at least 3 foramina mentalia, the oblique position of P^1, the presence of 2 roots in P_1 (the roots stand close to each other in one alveolus), the mandibular symphysis, extending no farther than the posterior root of P_1, and the measurements (resembling those of *Desmana kormosi*) do not allow the inclusion of the specimens from Podlesice, Węże and Rębielice Królewskie in this species.

Mygalinia hungarica (KORMOS, 1913) may be eliminated, above all, because of its measurements. This species is the smallest of all the *Desmaninae* known so far.

Desmana nehringi, at first described from Hungary, is also known from Poland, Germany, Czechoslovakia and the European part of the U.S.S.R.

Comparison of the remains of *D. nehringi* from different localities. The remains from Rębielice Królewskie and Węże do not differ from each other in size. The Middle Pliocene *D. nehringi* described by KOWALSKI (1956) from Podlesice and the Early Pleistocene specimen from Hajnačka, described by

Desmana nehringi KORMOS, dimen

	Rębielice Królewskie I MF/964					Węże I MF/967			Podlesice MF/2
	1	2	3	4	34	1	2	3	
P_1 length						1·19			
width						1·08			
height						1·00			
P_2 length						2·02	2·08		2·12
width						1·30	1·40		1·44
height						1·69	1·80		
P_3 length						1·80	1·80		
width						1·26	1·26		
P_4 length	2·16	2·12				2·20	2·27		2·23
width	1·47	1·54				1·48	1·51		1·44
height	1·69	1·37				1·80	2·08		2·05
M_1 length (max.)	3·13	3·13			2·98			3·06	3·06
width (post. lobe)	2·45	2·38			2·55			2·48	2·30
width (ant. lobe)	1·98	1·98			2·12			2·12	1·84
M_2 length (max.)	2·84	2·84	2·80	2·91	2·66			2·92	2·88
width (max.)	2·52	2·27	2·08	2·52	1·98			2·30	2·16
M_3 length (max.)									
width (max.)									
Height of mandible behind P_4 (int.)	3·89	4·17							3·96
Thickness there	1·90	1·80							
Height of mandible behind M_3 (int.)	4·25		4·10					4·14	
Thickness there	1·90		1·90					1·90	

O. FEJFAR (1964), are also more or less the same size. The measurements fo the specimens from Węże I, given by SULIMSKI (1959) are smaller. These differences in measurements may, however, be due to different techniques of measuring employed. *D. nehringi* described by SCHREUDER (1940) is somewhat larger than ours. The materials that she dealt with were derived from Hungary and Germany and dated from the Early Pleistocene (Villafranchian).

Neither are there any major morphological differences between the specimens obtained from different Polish localities. A comparison of our specimens with the description given by SCHREUDER (1940) shows a little more pronounced discrepancy, which consists in the somewhat different situation of one of the foramina mentalia (in the specimens from Hungary and Germany it is placed

Table IV

sions of mandibles and lower dentition

Hajnačka (O. Fejfar, 1961)			Węże I (A. Sulimski, 1959)			In A. Schreuder, 1940							
						Nat. Mus. Bud.			Basler Mus.			Kiel M.	c. A. S. A'dam
654030	65574	65576	1201	1202	1203	3876	3952	4039	724	726	77		
2·07						2·00 1·25 1·50		2·15 1·35 1·50	2·15 1·40				
1·82						1·95 1·35	2·10 1·30	1·90 1·30	2·00 1·40			2·00 1·30	2·05 1·30
2·22	2·26					2·50 1·50 1·70	2·50 1·50 1·95		2·70 1·60			2·50 1·60 2·00	2·50 1·60 2·00
	3·23		2·80 2·50 1·80	2·60 2·20 1·80	2·80 2·00 1·80	3·10 2·20 1·75		3·10 2·30 1·90	3·25 2·40 1·95	3·20 2·30 1·80	3·15 2·40 1·85	3·20 2·30 1·70	3·15 2·55 2·00
						2·90 2·05	3·00 2·20		3·00	3·00 2·10	2·95 2·05	3·00 2·20	2·95 2·15
				2·20 1·60	2·00 1·50	2·20 1·40	2·30 1·50		2·30	2·20 1·45		2·20 1·50	2·20 1·60
4·20	4·00					3·90	3·80		4·00				3·80
2·00	2·00					1·50	1·80		2·00				1·80
		4·45				4·0 0	4·00		4·10	4·20	4·15		4·10
		2·00				1·90	1·85		2·10	2·00	1·80		1·90

under the posterior root of M_1 and in those from Rębielice Królewskie I, Węże I and Podlesice under the anterior root or between the roots), the almost complete lack of the cingulum on P^1 and the occurrence of a distinct metaconid on P_4 in the specimens from Hungary and Germany. It may be said in general that, passing from the Pliocene to the Pleistocene, this species showed a tendency to increase its measurements (the materials from Hajnačka, being too fragmentary, must be omitted here). This phenomenon is, besides, generally encountered in desmans; the Pleistocene species were on the whole very large. In addition, P_4 of the forms from Germany and Hungary, and so the younger ones, shows a higher degree of molarization, manifested by the presence of the metaconid on it.

Desmana kormosi SCHREUDER, 1940
(Figs. 5—6)

1936 — *Galemys semseyi*, HELLER, N. Jb. Min. etc., 76, Beil.-Bd., B: 106 (partim).
1938 — *Galemys semseyi*, KORMOS, Festschr. Embr. Strand, 4: 171, Fig. 1.
1940 — *Desmana kormosi* spec. nov.; SCHREUDER, Arch. neerl. Zool., 4: 314—316, Pl. XI, 9, Text-figs. 36, 46, 47, 54.
1943 — *Desmana kormosi*, SCHREUDER, Verh. Geol. Mijnobouw Genot., Geol. Ser., 13: 402—403.
1956 — *Desmana kormosi*, KRETZOI, Geol. hung., 27: 152, 162, 164, 169, 204, 260.
1959 — *Galemys* (?) sp., SULIMSKI, Acta palaeont. pol., 4 (2): 139—140.
1960 — *Desmana kormosi*, KOWALSKI, Acta zool. cracov., 5 (5): 162—166, Pl. XIX.
1962 — *Desmana pontica*, SULIMSKI, Acta palaeont. pol., 7 (3—4): 454—457, Pl. I, Figs. 1—4. Pl. I, Figs. 5a—b, 6, 7a—b, 8.
1962 — *Desmana* cf. *kormosi*, SULIMSKI, Acta palaeont. pol., 7 (3—4): 458.
1962 — *Desmana pontica*, KOWALSKI, Acta theriol., 8 (4): 77.
1962 — *Desmana kormosi*, KOWALSKI, Acta theriol., 8 (4): 77.

Material. Węże I: 11 mandibular fragments with damaged processes and jointly containing the teeth I_3—M_1, 6 maxillary fragments with I^1—M^1, 2 toothless fragments and 1 well-preserved rostral portion of a skull with all the teeth but I_2 and I_3 (MF/966). The material described by SULIMSKI (1959, 1962) has also been examined.

Rębielice Królewskie I: detached I^1, P^2 or P^3, 2 nearly complete mandibular halves, 2 mandibular fragments and detached P_4 and M_1 (material described by KOWALSKI, 1960) and 29 other mandibular fragments, jointly bearing the teeth from P_2—M_2, 13 maxillary fragments with C—M^1 and detached first incisors (MF/963).

Rębielice Królewskie II: 3 toothless mandibular fragments and detached P_2, P_4, M_1 and M_2, 1 toothless maxillary fragment and detached I^1, M^1 and M^2 (MF/965).

Description. I^1 is slender and smaller than the corresponding tooth in *D. nehringi* from Podlesice. I^2 and I^3 (preserved only in one maxillary fragment from Węże) are one-rooted, very small and directed slantingly backwards. I^3 is smaller than I^2. The cingulum occurs at the front and at the back of this tooth, where it forms a kind of cusps, of which the anterior one is larger than the posterior. The canine has two roots and a distinct cingulum, which disappears only between the roots on the external side. A small cingular cusp occurs occasionally on the anterior side of the tooth. The canine is usually the same size as P^1, though sometimes these teeth differ in length.

The first premolar (P^1) stands straight in the tooth row and has two roots and two small cingular cusps in the same position as in I^3. P^2 is much larger than the canine and P^1, and its crown is more convex at the front and concave at the back. Out of its three roots, the internal one is thin and short, and the bulge of the crown above it is very poor. The cingulum occurs all round the tooth; it declines only between the roots on the external side and in some cases in the same region on the internal side. P^3 has also 3 roots, of which the internal

one is also fine and short. The crown base of this tooth has the shape of a triangle with strongly rounded vertices and occasionally it approximates even to a circle. The cingulum is present. Three-rooted P^4 has a big deuterocone supported by a robust root. The well-developed cingulum dwindles only in the middle of

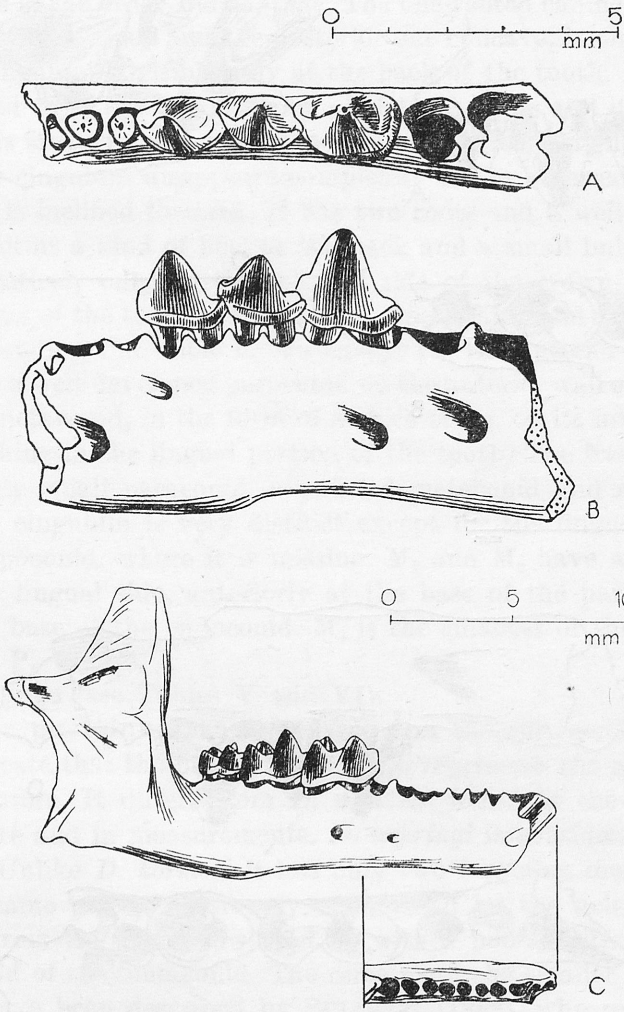


Fig. 5 — *Desmana kormosi* SCHREUDER from Rębielice Królewskie I, A—B — left mandibular fragment with P_2—P_4, specimen no. 28, C — right mandibular fragment with M_1—M_3, below anterior part seen from above, specimen no. 1

the protocone and over a small anterior section of the deuterocone. M^1 has 5 cusps on the external side, of which one is cingular. The cingulum is missing only between the protocone and the hypocone. M^2 has only 4 cusps externally. M^3 is the smallest and most reduced of the molars. However, only 2 last molars, and both heavily damaged at that, have been preserved in all the materials under study.

Mandible. The low mandibular ramus has, as a rule, 4 foramina mentalia (one of them may be reduced in some cases). Two of the foramina are large and have a fixed position, one under the canine and the other under the posterior

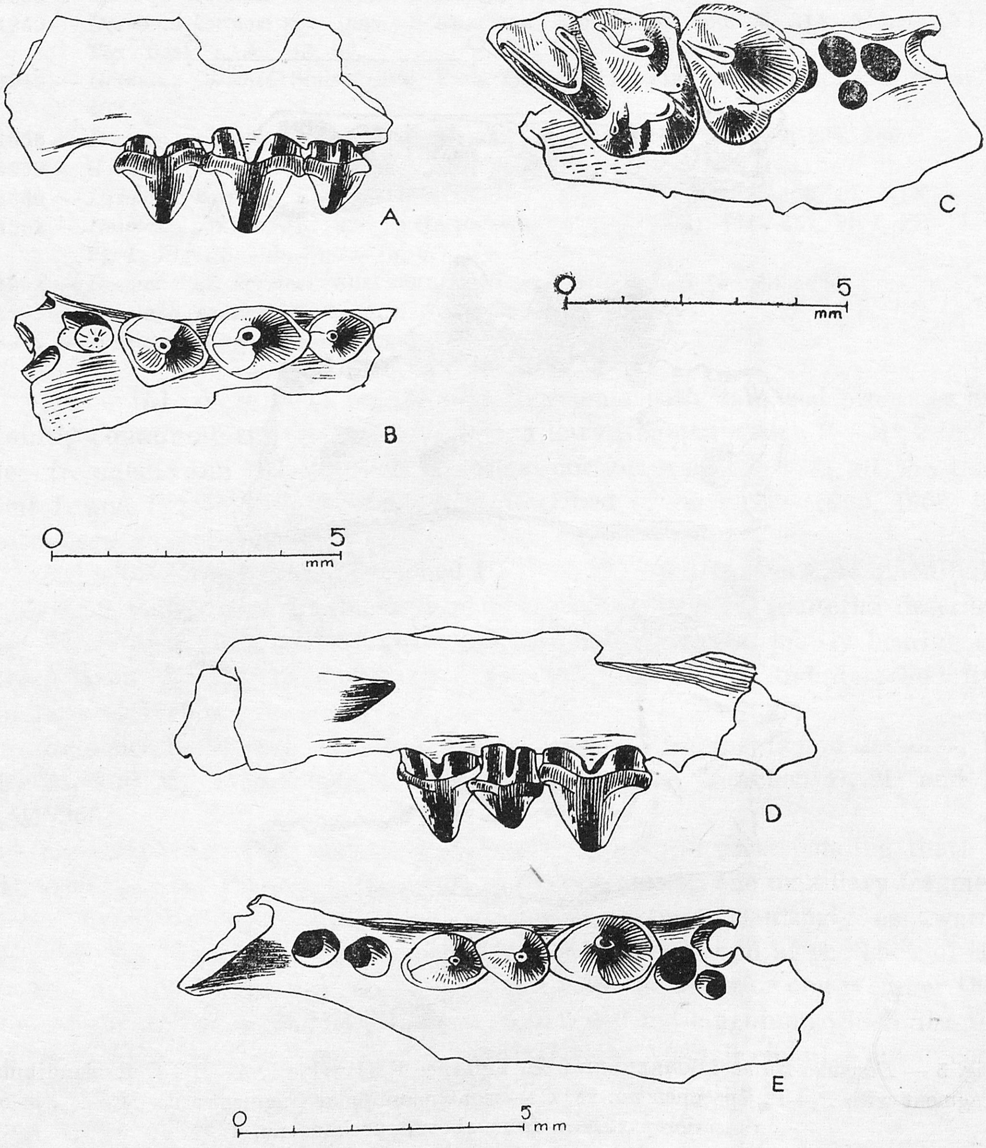


Fig. 6 — *Desmana kormosi* SCHREUDER from Rębielice Królewskie I, A—B — right maxillary fragment with P^1—P^3, specimen no. 4, C — left maxillary fragment with P^4—M^1, specimen no. 5, D—E — left maxillary fragment with C—P^2, specimen no. 15

root or between the roots of M_1. The other two openings are smaller and have a variable position. If one of them is situated under P_4, the other one lies either under the anterior root of P_2 or between P_1 and P_2. In some cases the mental

foramen can be seen under the posterior root of P_2 or the anterior root of P_3 instead of under P_4. In all the specimens of this species the mandibular symphysis reaches under the second premolar.

The lower incisors have not been preserved. Out of their alveoli, that of I_2 is the largest, as in the other *Desmaninae*. The one-rooted canine, whose anterior edge of the crown is convex and the posterior one concave, is markedly inclined forward. The cingulum is visible only at the back of the tooth. P_1 has one root, which is situated right in the tooth row of the mandible, and its crown widens posteriorly. It is smaller than neighbouring C and P_2 and slightly inclined forward. The poor cingulum disappears completely on its external side. P_2 is the last tooth that is inclined forward. It has two roots and a well-developed cingulum, which forms a kind of heel at the back and a small bulge at the front. It disappears entirely only on the internal side of the crown. Two-rooted P_3 does not stick out of the tooth row and has a small paraconid and a pronounced cingulum surrounding the whole crown except for the anterior cusp. P_4 is tricuspid. There is a well-developed paraconid on the anterior wall of the protoconid and a distinct metaconid, in the form of a thick ridge, on its internal wall. The cingulum is lacking in the lingual portion of the tooth. The five-cusped molars have a relatively small paraconid, a pointed metaconid and a large massive endoconid. The cingulum is very distinct except for the lingual and external sides of the hypoconid, where it is missing. M_1 and M_2 have additional cusps situated on the lingual side, anteriorly at the base of the paraconid and posteriorly at the base of the endoconid. M_3 is the smallest of the molars and it hardly exceeds P_4 in size.

Measurements (see Tables V and VI).

Systematic position. The characters and measurements given in the description indicate that the material examined represents the species *Desmana kormosi* SCHREUDER. It differs from *D. nehringi* found at the same localities both in structure and in measurements. *D. nehringi* is considerably larger and more massive. Unlike *D. kormosi* it has only two foramina mentalia, situated always in the same place, P_3 strongly compressed by the neighbouring teeth and displaced from the tooth row, and P_4 with a poorly differentiated paraconid and devoid of the metaconid. The remains of the smaller desman species from Węże I have been described by SULIMSKI (1962), who referred them to two forms: *Desmana pontica* SCHREUDER and *D.* cf. *kormosi*. In fact, they do not differ in an essential manner from each other or from the remains described in the present paper. To be sure, *Desmana pontica* resembles *D. kormosi* in size, but, judging from the description given by SCHREUDER (1940), it differs from this last species in several fundamental characters: its mandibular symphysis reaches only under P_1, P_3 — as in *D. nehringi* — is compressed by the neighbouring teeth and pushed out of the tooth row, P_1 has two roots and P^1 sticks obliquely in the maxilla. However, no specimens conformable to this description have been found either in the material described above or that described by SULIMSKI, except for a single fragment (No 305/2), in which the alveolus of P_3

Desmana kormosi SCHREUDER,

	Rębielice MF/963							
	4	5	9	10	11	12	13	15
I^2 length	0·50							
width	0·40							
I^3 length	0·58							
width	0·36							
C length								1·40
width								0·97
height (ext.)								1·12
P^1 length	1·15							1·26
width	0·90							1·00
height (ext.)	0·72							0·77
P^2 length	1·80				2·01			1·87
width	1·19				1·33			1·26
height (ext.)	1·12							1·26
P^3 length	1·69			1·80	1·98		1·80	
width	1·19			1·26			1·19	
P^4 length		2·38		2·34		2·66	2·45	
width		2·34		2·09		2·09	1·90	
M^1 length (ext.)		3·24	3·42					
length (across pl.)		2·09	1·98					
width (max.)		2·70	2·52					
width (at parast.)		2·34	2·41					
M^2 length (ext.)			2·41					
length (across pl.)			1·80					
width (max.)			2·70					
M^3 length (ext.)								
length (across pl.)								
width (max.)								

is clearly displaced from the tooth row (this specimen was, besides, described by SULIMSKI as *D.* cf. *kormosi*). Moreover, *D. pontica* is geologically much older, for it has been described from the Late Miocene layers and, consequently, its occurrence at our localities is hardly probable. Neither does any of the other fossil species dating from the Pliocene and Early Pleistocene and described above in the discussion of *D. nehringi* come into consideration on account of the differences in size and morphology.

The remains of *Desmana kormosi*, described for the first time from Hungary, are also known from Germany (HELLER, 1934) and Poland (KOWALSKI, 1960). So far they have been found in three Polish localities: Węże I and Rębielice Królewskie I and II. The specimens from these localities do not differ in morpho-

Table V

dimensions of upper dentition

Królewskie I				Węże I MF/966						In A. Schreuder 1940	
16	17	18	19	2	2a	4	5	7	8	N. H., B. 4045	coll HELLER
	1·26				1·08	1·20					
	0·90				0·86	0·97					
	0·84				0·77	0·72					
1·15	1·40				1·08						
0·97	1·00				0·83						
0·68	0·84				0·65						
1·84	1·94	1·90	1·87	1·48	1·26						
1·26	1·19	1·12	1·19	1·08	1·19						
0·90	1·22	1·15	1·12	1·08	1·08						
1·80		1·69		1·26	1·48		1·50		1·48		
1·37		1·33		1·15	1·12		1·12		1·22		
		2·34		1·94	2·01			2·23	1·98	2·35	
		1·98		2·09	2·01			2·01	1·84	2·20	
				3·02	3·06		3·06		3·17	3·25	3·50
				1·87	1·80		1·94		1·98	1·95	1·95
				2·48	2·45		2·41		2·34	2·55	2·60
				2·23	2·23		2·23		2·23	2·40	2·30
				2·19	2·30					2·40	
				1·62	1·79					1·75	
				2·52	2·52					2·70	
				1·59						2·15	
				1·51						1·55	
				2·08						2·15	

logy, but they do in size. The remains from Węże I, geologically older, are smaller than the specimens from Rębielice Królewskie I and II. The measurements of the Early Pleistocene specimens from Hungary and Germany described by Schreuder (1940) agree with those of the specimens from Rębielice Królewskie and there are not any significant morphological differences between them, either (Fig. 7—8). Judging from Schreuder's description, the only character distinguishing our specimens from the Hungarian and German ones is the presence of the entoconid and hypoconid on P_4 in these last specimens. Thus, the situation would resemble that observed in *D. nehringi*. The geologically older forms are smaller in size, and the larger younger forms show a stronger molarization of P_4.

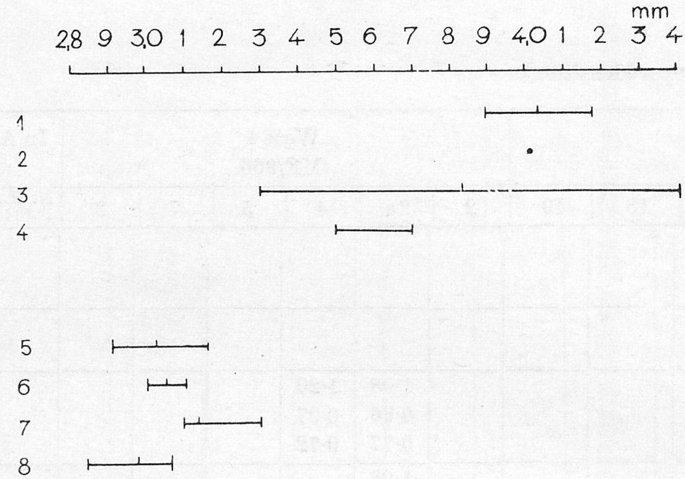


Fig. 7 — Mandibular heighth behind P_4 in some fossil species of *Desmana*, 1 — *Desmana nehringi* KORMOS, Rębielice Królewskie I, 2 — *Desmana nehringi* KORMOS, Podlesice (K. KOWALSKI, 1956), 3 — *Desmana nehringi* KORMOS (A. SCHREUDER, 1940), 4 — *Desmana nehringi* KORMOS (materials from Earth Museum, Warsaw), 5 — *Desmana kormosi* SCHREUDER, Rębielice Królewskie I, 6 — *Desmana kormosi* SCHREUDER, Rębielice Królewskie I (K. KOWALSKI, 1960), 7 — *Desmana kormosi* SCHREUDER (A. SCHREUDER, 1940), 8 — *Desmana kormosi* SCHREUDER, Węże I

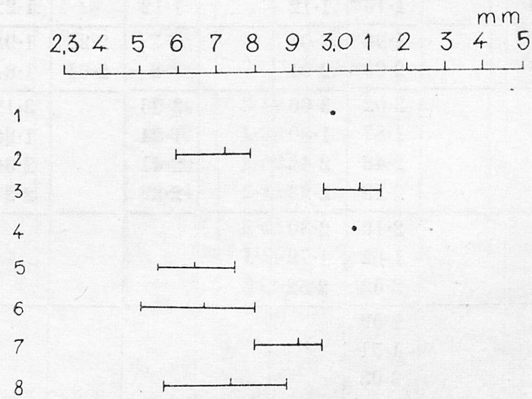


Fig. 8 — Length of M_1 in some fossil species of *Desmana*, 1 — *Desmana nehringi* KORMOS, Podlesice (K. KOWALSKI, 1956), 2 — *Desmana nehringi* KORMOS, Węże I (A. SULIMSKI, 1959), 3 — *Desmana nehringi* KORMOS, Rębielice Królewskie I, 4 — *Desmana nehringi* KORMOS, Węże I, 5 — *Desmana kormosi* SCHREUDER, Beremend (A. SCHREUDER, 1940), 6 — *Desmana kormosi* SCHREUDER, Rębielice Królewskie I (K. KOWALSKI, 1960), 7 — *Desmana kormosi* SCHREUDER, Rębielice Królewskie I, 8 — *Desmana kormosi* SCHREUDER, Węże I

Desmana sp.
(Fig. 9)

Material. Kamyk: fragment of mandibular ramus with damaged M_2 and a detached M_1 (MF/974).

Description. The low mandibular ramus is characterized by the presence of a large foramen mentale situated between the roots of M_1. This tooth has

Desmana kormosi SCHREUDER, dimensions of mandibles and lower dentition

Rębielice Królewskie I MF/963	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
C length																													
C width																													
C height																													
P_1 length																													
P_1 width																													
P_1 height																													
P_2 length																								1·58	1·60				
P_2 width																								0·90	1·00				
P_2 height																													
P_3 length					1·60																			1·58					
P_3 width					0·97																			0·94					
P_4 length	1·90		1·87		1·94	1·90	1·90														1·80	1·98		1·90	1·98	1·84	1·98		
P_4 width	1·00		1·15		1·11	1·08	1·18														1·29	1·11		1·00	1·30	1·00	1·11		
P_4 height	1·00		1·22		1·58	1·51	1·22														1·55	1·51		1·65	1·33	1·55	1·62		
M_1 length (max.)		2·91				2·91	2·92		2·95		2·80				2·98		2·91	2·98									2·84	2·88	
M_1 width (post. lobe)		2·19				2·23	2·16		2·19		2·05				2·19		2·16	2·19									2·26	2·19	
M_1 width (ant. lobe)		1·80				1·80	1·83		1·66		1·80				1·87		1·76	1·80									1·80	1·69	
M_2 length (max.)		2·70		2·74				2·80	2·70	2·70	2·70	2·70	2·73	2·63	2·70		2·73	2·73											2·66
M_2 width (max.)		2·16		1·94				2·16	2·08	1·98	2·05	1·98	1·94	1·94	1·94		1·94	2·16											2·19
M_3 length (max.)		1·98						2·01	1·98		1·94					1·98			2·12	1·98			2·05						
M_3 width (max.)		1·76						1·73	1·66		1·62					1·44			1·44	1·44			1·47						
Height of mandible behind P_4		3·06	3·24	2·92	2·95	2·98	3·06														2·95	3·13		2·91		2·91	3·16		
Thickness there		1·30	1·30	1·40	1·30	1·30	1·30														1·30	1·30		1·50		1·40	1·40		
Height of mandible behind M_3	3·13	3·42						3·31	3·13	3·16	3·20	3·31	3·31	3·27	3·16	3·70	3·38		3·06	3·13			3·52						
Thickness there	1·60	1·50						1·50	1·60	1·50	1·60	1·50	1·50	1·60	1·40	1·60	1·50		1·50	1·50			1·70						

	Węże I MF/966									In A. SCHREUDER 1940			(K. KOWALSKI, 1960) MF/63 Rębielice Królewskie I			
	4	5	6	7	8	9	10	11	12	2	3	4	1	2	3	4
C length									1·11							1·20
C width									0·90							0·80
C height																1·10
P_1 length									0·90							1·10
P_1 width									0·90							0·80
P_1 height																1·00
P_2 length							1·67		1·30			1·50				1·40
P_2 width							0·90		0·90			0·95				0·90
P_2 height							1·08		1·22			1·35				1·30
P_3 length									1·40							
P_3 width									0·94							
P_4 length	1·80									1·70	1·85	1·70				
P_4 width	1·15									1·10	1·05	1·05				
P_4 height	1·48									1·40	1·55	1·30				
M_1 length (max.)	2·88		2·80			2·56		2·70		2·75	2·55		2·70		2·80	2·50
M_1 width (post. lobe)	2·16		2·09			2·16		2·12		2·00	1·85		1·80		1·70	1·70
M_1 width (ant. lobe)	1·66		1·66			1·80		1·80		1·60	1·40		1·40		1·30	1·70
M_2 length (max.)			2·59		2·56	2·30				2·50	2·50	2·50	2·50	2·50	2·50	2·40
M_2 width (max.)			1·98		2·05	2·08				1·80	1·80	1·85	1·60	1·70	1·50	1·70
M_3 length (max.)		1·90	1·76	1·76	1·73	1·73				1·90		2·00	1·90	1·90		1·90
M_3 width (max.)		1·50	1·58	1·37	1·62	1·69				1·45		1·35	1·30	1·30		1·30
Height of mandible behind P_4	2·95		2·84			3·06				3·30	3·10	3·10	3·10			3·00
Thickness there	1·50		1·40			1·40				1·50	1·30	1·30	1·30			1·40
Height of mandible behind M_3		3·20		3·06	2·99	3·24				3·50		3·30	3·70	3·10	3·10	3·70
Thickness there		1·50	1·60	1·60	1·50	1·50				1·70		1·70	1·60	1·50	1·60	1·60

five cusps of which the paraconid is relatively large, the metaconid higher and more pointed and the endoconid broad and robust. The cingulum of M_1, which is larger then M_2, is conspicuous, it surrounds protoconid and paraconid and develops additional cusps situated lingually, anterior to the base of paraconid and posterior to the base of endoconid. The damaged enamel of M_2 makes the detailed description of this tooth impossible. In all probability it was, however, morphologically identical with M_1 as in other *Desmaninae*.

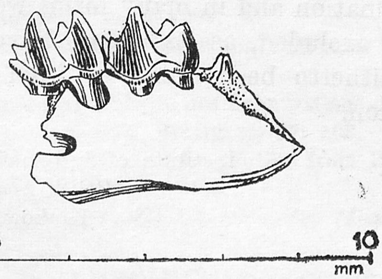


Fig. 9. *Desmana* sp., from Kamyk, left mandibular fragment with M_1—M_2

Table VII

Desmana sp., dimensions of mandible, M_1 and M_2

	Desmana sp. Kamyk MF/974	*Desmana kormosi* Rębielice Królewskie I				*Desmana nehringi* Rębielice Królewskie I, Węże I, Podlesice			
		min	avg	max	n	min	avg	max	n
M_1 length (max.)	2·91	2·80	2·91	2·98	10	2·98	3·07	3·13	5
M_1 width (post. lobe)	2·16	2·05	2·18	2·26	10	2·30	2·43	2·55	5
M_1 width (ant. lobe)	1·73	1·66	1·78	1·87	10	1·84	2·01	2·12	5
M_2 length (max.)	2·57	2·63	2·71	2·80	10	2·66	2·84	2·92	7
M_2 width (max.)	1·80	1·94	2·01	2·16	10	1·98	2·26	2·52	7
Height of mandible behind M_1 (int.)	3·81	2·88	3·19	3·53	10	4·25	4·47	4·68	4
Thickness there	1·60	1·60	1·63	1·80	10	2·10	2·20	2·30	4
Height of mandible behind M_2 (int.)	3·96	3·24	3·49	3·82	10	4·36	4·59	5·08	5
Thickness there	1·80	1·50	1·60	1·70	10	1·90	2·02	2·10	5

Measurements (see Table VII).

Systematic position. The size and morphology of the mandible given above indicate that the specimen from Kamyk belongs to the genus *Desmana*. Unfortunately, very scanty and uncharacteristic material makes its specific determination impossible. A comparison with the specimens of *D. kormosi* and *D. nehringi* from Podlesice, Węże and Rębielice Królewskie does not indicate any morphological pecularities, its dimensions however are slightly different.

The mandible from Kamyk, beeing of the same width and having molars of the same dimensions as in *D. kormosi* is intermediate in its height between the last mentioned species and *D. nehringi*. The small measurements of the specimen from Kamyk place its membership in the group of large Pleistocene water-moles of the species *D. moschata* and *D. thermalis* out of the question. The comparison with smaller as well as with geologically younger species is impossible because this part of mandible and two first molars are in water-moles not sufficient for specific determination and in many forms were never described. Only *Galemys semseyi* can be excluded, as its molars have no cingulum at all.

Water-moles have hitherto been unknown from European sediments of the first (Günz) glaciation.

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REFERENCES

Bate, D. M. A. 1937. Palaeontology: The fossil fauna of the Wady El-Mughara caves. In: D. A. E. Garrod and D. M. A. Bate: The stone age of Mount Carmel. Clerendon Press, Oxford, **1**: 135—240.

Brunner, G. 1934. Eine präglaziale Fauna aus dem Windloch bei Sackdilling (Oberpfalz). Neues Jb. Geol. Paläont., B. Stuttgart, **71**: 303—328.

Czyżewska, T. 1968. Deers from Węże and their relationship with the Pliocene and recent Eurasiatic *Cervidae*. Acta palaeont. pol., Warszawa, **13** (4): 537—603.

Czyżewska, T. 1969. *Nyctereutes sinensis* Schlosser *(Canidae, Mammalia)* from the Pliocene breccia in Węże (Poland). Acta zool. cracov., Kraków, **14** (17): 441—450.

Fahlbusch, V. 1969. Pliozäne und Pleistozäne *Cricetinae (Rodentia, Mammalia)* aus Polen. Acta zool. cracov., Kraków, **14** (5): 99—137.

Fejfar, O. 1961. Die plio-pleistozänen Wirbeltierfaunen von Hajnačka und Ivanovce (Slovakei), CSR. Neues Jb. Geol. Paläont., Stuttgart, **111** (3): 257—273.

Fejfar, O. 1964. The Lower-Villafranchian vertebrates from Hajnačka near Filákovo in Southern Slovakia. Rozpravy Ústr. úst. geol., Praha, **30**: 1—115.

Heller, F. 1936. Eine oberpliocäne Wirbeltierfauna aus Rheinhessen. Neues Jb. Geol. Paläont. B, Stuttgart, **76**: 99—160.

Kormos, T. 1913. Trois nouvelles especes fossiles des desmans en Hongrie. Annales Mus. nat. hung., Budapest, **11**: 125—146.

Kormos, T. 1934. Neue Insektenfresser, Fledermäuse und Nager aus dem Oberpliozän der Villányer-Gegend. Földt. Közl., Budapest, **64**: 296—321.

Kormos, T. 1938. Zur näheren Kenntnis der oberpliozänen Bisamspitzmäuse Südungarns. Festschr. Embrik Strand, Riga, **4**: 163—180.

Kowalski, K. 1958. An early Pleistocene fauna of small mammals from the Kadzielnia Hill in Kielce (Poland). Acta palaeont. pol., Warszawa, **3** (1): 1—47.

Kowalski, K. 1960a. An early Pleistocene fauna of small mammals from Kamyk (Poland). Folia quatern., Kraków, **1**: 1—24.

Kowalski, K. 1960b. Pliocene Insectivores and Rodents from Rębielice Królewskie (Poland). Acta zool. cracov., Kraków, **5** (5): 155—201.

Kowalski, K. 1963. The Pliocene and Pleistocene *Gliridae (Mammalia, Rodentia)* from Poland. Acta zool. cracov., Kraków, **8** (14): 533—567.

Kowalski, K. 1964. Paleoekologia ssaków pliocenu i wczesnego plejstocenu Polski. Acta theriol., Białowieża, **8** (4): 73—88.

Kretzoi, M. 1954. Bericht über die calabrische (Villafranchische) Fauna von Kisláng, Kom. Fejér. M. AU. Földt. Int. Évi Jel., Budapest, **1953**: 213—238.

Kretzoi, M. 1956. Die altpleistozänen Wirbeltierfaunen des Villányer Gebirges. Geol. hungarica, ser. palaeont., Budapest, **27**: 1—264.

Kretzoi, M. 1962. Fauna und Faunenhorizont von Csarnota. M. Áll. Földt. Int. Évi Jel., Budapest, **1959**: 297—395.

Leche, W. 1902. Zur Entwicklungsgeschichte des Zahnsystems der Säugetiere. II Teil: Phylogenie, 1 Heft: *Erinaceidae*. Zoologica, Stuttgart, **37**: **103**.

Młynarski, M. 1960. Pliocene Amphibians and Reptiles from Rębielice Królewskie (Poland). Acta zool. cracov., Kraków, **5** (4): 131—153.

Schreuder, A. 1940. A revision of the fossil water-moles *(Desmaninae)*. Archives néerl. de Zoologie, Leiden, **4**: 201—257.

Schreuder, A. 1943. Fossil voles and other mammals (*Desmana, Talpa, Equus* etc.) out of well-borings in the Netherlands. Verh. Geol. Mijnbouw Genootsch., Geol. Ser., s'Gravenhage, **13**: 399—434.

Sulimski, A. 1959. Pliocene Insectivores from Węże. Acta palaeont. pol., Warszawa, **4** (2): 119—173.

Sulimski, A. 1962a. O nowym znalezisku kopalnej fauny kręgowców w okolicy Działoszyna. Przegląd geol., Warszawa, **10** (4—5): 219—223.

Sulimski, A. 1962b. Supplementary studies on the Insectivores from Węże I (Poland). Acta palaeont. pol., Warszawa, **7** (3—4): 441—502.

Topatchevsky, W. O. 1962. Топачевський, В. О. 1962. Викопні вихухолі роду Десмана з неогенових та антропогенових відкладів европейської частини С. Р. С. Р.: Викопні фауни України і суміжних територій. Інст. зоол. А. Н. У. Р. С. Р., Київ, **1**: 5—90.

Young, C. C. 1934. On the *Insectivora, Chiroptera, Rodentia* and *Primates* other than *Sinanthropus* from Locality 1 at Choukoutien. Palaeont. sinic., Peking, C, **8** (3): 1—160.

STRESZCZENIE

Praca jest pierwszą częścią zamierzonego opracowania całości materiału owadożernych *(Insectivora)* z pliocenu i plejstocenu Polski. Zawiera ona opis szczątków rodziny *Erinaceidae* i podrodziny *Desmaninae* ze stanowisk faun kopalnych położonych w środkowej Polsce. Są to: fauna z Podlesic datowana na środkowy pliocen, z Wężów I, datowana na najmłodszy pliocen, z Rębielic Królewskich I i II z najmłodszego pliocenu lub dolnego wilafranszu, z Kadzielni datowana na starszy plejstocen (prawdopodobnie interglacjał Tiglian) i z Kamyka z okresu zlodowacenia Günz. Materiał zawierał następujące gatunki: z Podlesic — *Desmana nehringi* Kormos, z Wężów I — *Erinaceus samsonowiczi* Sulimski, *Desmana nehringi* Kormos i *Desmana kormosi* Schreuder,

z Rębielic Królewskich I — *Erinaceus* sp., *Desmana nehringi* KORMOS i *Desmana kormosi* SCHREUDER, z Rębielic Królewskich II — *Erinaceus* sp. i *Desmana kormosi* SCHREUDER, z Kadzielni — *Erinaceus* sp. i z Kamyka — *Erinaceus* sp. i *Desmana* sp. Wszystkie te gatunki były już częściowo opisane w polskiej literaturze paleontologicznej przez K. KOWALSKIEGO (1956, 1960, 1964) i A. SULIMSKIEGO (1959, 1962b). Badany materiał znajduje się w zbiorach Zakładu Zoologii Systematycznej i Doświadczalnej Polskiej Akademii Nauk w Krakowie i w Muzeum Ziemi w Warszawie.

Omawiane w pracy szczątki żuchw i zębów trwałych *Erinaceus samsonowiczi* są bardzo niekompletne i nie wnoszą nic nowego do opisu A. SULIMSKIEGO (1959, 1962b). Na uwagę zasługuje natomiast P^4 mleczny, który zasadniczo różni się od P^4 definitywnego, m. in. przez swoje odmienne proporcje. Oprócz *E. samsonowiczi* znaleziono jeszcze inne szczątki rodzaju *Erinaceus*, jednak bardzo skąpy materiał nie pozwolił ustalić ich przynależności gatunkowej. Ogólnie biorąc okazy tego rodzaju z Rębielic Królewskich I i II były mniejsze od *E. samsonowiczi*, a tym samym od *E. europaeus*, natomiast w Kadzielni i Kamyku żyły prawdopodobnie dwa gatunki jeży różniące się wyraźnie rozmiarami, przy czym jeden odpowiadał wymiarami okazom z Rębielic Królewskich I i I, a drugi był prawie tak duży, jak *E. europaeus*.

Wielkość i morfologia opisanych szczątków desman wskazuje na ich przynależność do gatunków *Desmana nehringi* KORMOS i *Desmana kormosi* SCHREUDER. Szczątki tego drugiego gatunku z Wężów I opisane były przez A. SULIMSKIEGO pod nazwami *Desmana pontica* i *Desmana* cf. *kormosi* (SULIMSKI, 1962b). W rzeczywistości materiał ten należy do jednego gatunku, a mianowicie *D. kormosi*. Ogólnie stwierdzić było można, że w miarę upływu czasu od pliocenu do plejstocenu można u obu gatunków desman obserwować znaną zresztą w tej grupie tendencję do powiększania wymiarów i postępującej molaryzacji P_4.

РЕЗЮМЕ

Работа является первой частью планируемого исследования материала по насекомоядным плиоцена и плейстоцена Польши. Она содержит описание остатков представителей семейства *Erinaceidae* и подсемейства *Desmaninae* из местонахождений фаун, расположенных в средней Польше: фауны из Подлесице, датируемой средним плиоценом, Венже I (верхний плиоцен), Рембелице Крулевске I и Рембелице Крулевске II (верхний плиоцен или нижний виллафранк), Кадзельня (ранний плейстоцен, вероятнее всего, тиглийский интергляциал) и Камык (гюнц). Материал содержит следующие виды: Подлесице — *Desmana nehringi* KORMOS; Венже I — *Erinaceus samsonowiczi* SULIMSKI, *Desmana nehringi* KORMOS и *Desmana kormosi* SCHREUDER; Рембелице Крулевске I — *Erinaceus* sp., *Desmana nehringi* KORMOS и *Desmana kormosi* SCHREUDER; Рембелице Крулевске II —

Erinaceus sp. и *Desmana kormosi* SCHREUDER; Кадзельня — *Erinaceus* sp.; Камык — *Erinaceus* sp. и *Desmana* sp. Все эти виды частично уже были описаны в польской палеонтологической литературе К. Ковальским (K. KOWALSKI, 1956 1960, 1964) и А. Сулимским (A. SULIMSKI, 1959, 1962 в). Изученный материал находится в собраниях Института зоологической систематики и экспериментальной зоологии Польской Академии Наук в Кракове и Музея Земли в Варшаве.

Описываемые в работе остатки челюстей и постоянных зубов *Erinaceus samsonowiczi* очень фрагментарны и не добавляют ничего нового к описанию А. Сулимского (1959, 1962 в). Весьма интересным оказался молочный p^4, существенно отличающийся от постоянного P^4, особенно пропорциями. Кроме *E. samsonowiczi* были обнаружены также остатки и других видов рода *Erinaceus*, однако скудный материал не позволил установить их видовой принадлежности. Вообще говоря, экземпляры из Рембелице Крулевске I и II были мельче *E. samsonowiczi* и *E. europaeus*, в то время, как в Кадзельне и Камыке, вероятно, было два вида ежей, четко различающихся по размерам, причем один из этих видов соответствует размерам экземпляров из Рембелице Крулевске I и II, а другой более или менее соизмерим с *E. europaeus*.

Размеры и морфологические особенности описанных выхухолей указывают на их принадлежность к видам *Desmana nehringii* KORMOS и *Desmana kormosi* SCHREUDER. Остатки последнего были описаны из Венже I под названиями *Desmana pontica* и *Desmana* cf. *kormosi* (A. SULIMSKI, 1962). В самом же деле этот материал принадлежит к одному виду — *D. kormosi*. Можно утверждать, что при переходе от плиоцена к плейстоцену у обоих видов выхухолей наблюдается тенденция к увеличению размеров тела и значительной моляризации P^4, известная и для других форм выхухолей.

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